

WE CLAIM:

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A method of field sample collection for the detection of arsenic species As(III), As(V) monomethylarsinate (MMA), and dimethylarsinate (DMA) in drinking water which comprises:

5 (a) providing three separate solid-phase extraction columns for a serial extraction of the drinking water in the field wherein

10 (1) a first of the columns which is a cation exchange column comprising a first medium for ion exchanging which removes interfering cation ions in the water from the As(V), MMA, DMA, and As(III) in the water;

15 (2) a second of the columns which is a cation exchange column comprising a second medium at a pH of about 1.0 to 1.5 for ion exchanging which removes the DMA in the water from the As(V), MMA, and As(III) in the water; and

20 (3) a third of the columns which is an exchange/sorption column comprising a dioctyltin dichloride coated medium at a pH of 2.5 to 3.5 which removes the As(V) and MMA in the water while the As(III) remains in the water; and

(b) serially introducing the water into the first, second, and third columns, and collecting a first effluent from the third column containing the As(III).

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The method of Claim 1 wherein the first medium for the first of the columns is a weak acid cation exchange media.

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The method of Claim 2 wherein the weak acid cation medium comprises a functional group selected from the group consisting of iminodiacetate, amino phosphonic, phosphinic, and methylene thiol.

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The method of Claim 3 wherein the functional group is iminodiacetate.

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The method of Claim 2, 3, or 4 wherein the first medium comprises polystyrene divinylbenzene.

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The method of Claim 1 wherein the second medium for the second of the columns is a strong acid cation exchange medium.

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The method of Claim 6 wherein the strong acid cation medium comprises a sulphonate functional group.

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The method of Claim 6 or 7 wherein the second medium comprises polystyrene divinylbenzene.

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The method of Claim 1 wherein the third medium comprises calcined diatomaceous earth.

A kit for collection of a field sample for the detection of arsenic species As(III), As(V), monomethylarsinate (MMA), and dimethylarsinate (DMA) in drinking water which comprises:

5 three separate solid-phase extraction columns wherein

 (1) a first of the columns which is a cation exchange column comprising a first medium for ion exchanging which removes interfering cation ions in the
10 water from the As(V), MMA, DMA, and As(III) in the water;

 (2) a second of the columns which is a cation exchange column comprising a second medium at a pH of about 1.0 to 1.5 for ion exchanging which removes the DMA in the water from the As(V), MMA, and As(III) in the
15 water; and

 (3) a third of the columns which is an exchange/sorption column comprising a dioctyltin dichloride coated third medium at a pH of 2.5 to 3.5 which removes the As(V) and MMA in the water while the
20 As(III) remains in the water.

The kit of Claim 10 wherein the first medium of the first of the columns is a weak acid cation exchange media.

The kit of Claim 11 wherein the weak acid cation medium comprises a functional group selected from the group consisting of iminodiacetate, amino phosphonic, phosphinic, and methylene thiol immobilized thereon.

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The kit of Claim 12 wherein the functional group is iminodiacetate.

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The kit of Claim 11, 12, or 13 wherein the first medium comprises polystyrene divinylbenzene.

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The kit of Claim 10 wherein the second medium of the second of the columns is a strong acid cation exchange media.

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The kit of Claim 15 wherein the strong acid cation medium comprises a sulphonate functional group.

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The kit of Claim 15 or 16 wherein the second medium comprises polystyrene divinylbenzene.

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The kit of Claim 10 wherein the third medium of the third column comprises calcined diatomaceous earth.

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A method of field sample collection for the detection of arsenic species As(III), As(V) monomethylarsinate (MMA), and dimethylarsinate (DMA) in drinking water which comprises:

(a) providing three separate solid-phase extraction media for a serial extraction of the drinking water in the field wherein

(1) a first of the media removes interfering cation ions in the water from the As(V), MMA, DMA, and As(III) in the water;

(2) a second of the media at a pH of about 1.0 to 1.5 removes the DMA in the water from the As(V), MMA, and As(III) in the water; and

(3) a third of the media at a pH of 2.5 to 3.5 removes the As(V) and MMA in the water while the As(III) remains in the water; and

(b) serially introducing the water into the first, second, and third media, and collecting a first effluent from the third media containing the As(III).

The method of Claim 19 wherein the first of the media is a weak acid cation exchange medium.

The method of Claim 20 wherein the weak acid cation medium comprises a functional group selected from the group consisting of iminodiacetate, amino phosphonic, phosphinic, and methylene thiol.

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The method of Claim 21 wherein the functional group is iminodiacetate.

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The method of Claim 20, 21, or 22 wherein the first of the media comprises polystyrene divinylbenzene.

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The method of Claim 19 wherein the second of the media is a strong acid cation exchange medium.

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The method of Claim 24 wherein the strong acid cation medium comprises a sulphonate functional group.

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The method of Claim 24 or 25 wherein the second of the media comprises polystyrene divinylbenzene.

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The method of Claim 19 wherein the third of the media comprises calcined diatomaceous earth.

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A kit for collection of a field sample for the detection of arsenic species As(III), As(V), monomethylarsonate (MMA), and dimethylarsinate (DMA) in drinking water which comprises:

5 three separate solid-phase extraction media wherein

(1) a first of the media removes interfering cation ions in the water from the As(V), MMA, DMA, and As(III) in the water;

10 (2) a second of the media which at a pH of about 1.0 to 1.5 removes the DMA in the water from the As(V), MMA, and As(III) in the water; and

15 (3) a third of the media which at a pH of 2.5 to 3.5 removes the As(V) and MMA in the water while the As(III) remains in the water.

The kit of Claim 28 wherein the first of the media is a weak acid cation exchange medium.

The kit of Claim 29 wherein the weak acid cation medium comprises a functional group selected from the group consisting of iminodiacetate, amino phosphonic, phosphinic, and methylene thiol immobilized thereon.

The kit of Claim 30 wherein the functional group is iminodiacetate.

The kit of Claim 29, 30, or 31 wherein the first of the media comprises polystyrene divinylbenzene.

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The kit of Claim 28 wherein the second of the media is a strong acid cation exchange medium.

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The kit of Claim 15 wherein the strong acid cation medium comprises a sulphonate functional group.

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The kit of Claim 33 or 34 wherein the second of the media comprises polystyrene divinylbenzene.

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The kit of Claim 28 wherein the third of the media comprises dioctyltin dichloride coated calcined diatomaceous earth.

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